

Potential Reduction of Cervical Incidence & Mortality Simulation

**Lombardi Cancer Center
Clinical and Economic Outcomes Core
Cancer Prevention and Control
Program**

Known & Need to Know - Incidence

- **Ecological links to Incidence with**
 - poverty/low social class
 - older age
 - inadequate insurance
 - lack of transportation and medical care infrastructure
- **What are risk factor prevalence rates?**
 - HPV, Smoking, Sexual practices, Micronutrients
- **If elevated:**
 - Will risk factor reduction be acceptable, effective, and cost-effective?
 - Will HPV testing or other new technology improve outcomes?
 - Would HPV vaccination be acceptable?

Known & Need to Know – Screening & Stage of Disease at Diagnosis

- Population characteristics associated with under-screening, low follow-up, and late stage concentrated in rural areas, BUT
- Screening rates appear comparable to U.S. overall
- Little data to suggest low follow-up rates
- Little data to suggest differences in stage distribution in SEER
- Are rates of timely follow-up low? If so:
 - Will same day screen and treat models be effective?
- Does failure to receive timely follow-up affect future screening behavior?
- Do false positive results affect return to routine screening?

Known & Need to Know - Treatment

- **90% of patients receive some treatment for invasive disease**
- **What are treatment patterns?**
 - by type of hospital
 - by presence or absence of hospitals
 - by provider characteristics
 - by patient characteristics
- **What are barriers to recommended treatment?**
- **Is treatment consistent with current standards?**

Cancer Control Simulation

Model natural history of cervical carcinogenesis:

- 17 state semi-Markov model using stochastic simulations
- Assumes
 - HPV infection is the key event
 - Assumes baseline screening rate is 78%
 - 100% compliance with testing every 3 years
- Uses best quality published data

Cancer Control Simulation

Preliminary results:

- Reducing HPV by half could reduce incidence (and mortality) by 42% from current levels
- Additional screening could save lives if
 - screening rates are $\leq 60\%$
 - test sensitivity exceeds 70%
 - low sensitivity tests are used more often
- Adding chemotherapy to invasive treatment provides modest gains

Projections of Cancer Control Interventions

Strategy	Incident Cases Averted per 100,000		Cervical Cancer Deaths Averted per 100,000	
	Number	% Reduction	Number	% Reduction
Reducing HPV infection rates to ½ current levels	323	42	114	43
Increasing compliance with triennial screening rate				
from 40% to 78%	848	53	439	63
from 78% to 90%	189	25	89	34
Decreasing interval between tests from every 3 to 2 years	317	41	131	49
Decreasing interval between tests from every 3 to 1 year	637	83	236	89
Increasing Pap smear sensitivity from 70 to 90%	303	39	133	48
Adding chemotherapy treatment regimens	—	—	80	30

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Conclusions:

- **Invest in HPV prevention**
- **Invest in Screening in areas with pockets of under-screened women**
- **Improve quality of Pap smears, screen more often, OR apply a better screening test**
- **Screening more often with a poor quality test is not likely to be a cost-effective use of rural health care resources**